

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER & SYSTEMS COMPANIES — WORLDWIDE

MAY 1, 1989

RAISING SUN

McNealy cultivates the
growth leader PAGE 24

100 Fastest growing
U.S. companies PAGE 34

Top U.S. firms in Japan PAGE 68



McNealy,
President and CEO

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER AND SYSTEMS COMPANIES — WORLDWIDE

VOL. 15, NO. 9

MAY 1, 1989



PAGE 24 Sun CEO Scott McNealy cultivates the growth leader

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24 Raising Sun: McNealy cultivates the growth leader

Sun Microsystems is the undisputed U.S. sales growth leader for the second year running. Racing along at a blistering pace with a five-year compound annual rate of 161%, Sun again tops our list of the 100 fastest growing U.S. electronics companies. All along, CEO Scott McNealy has managed Sun's growth with two parts freewheeling style, one part courage, and a generous helping of luck. But now, as Sun keeps on growing, tight operating disciplines are beginning to temper the zealous growth religion that once dominated.

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There's no magic to Sun's success story, so says CEO Scott McNealy. Only the usual things, like "Getting enough sleep, thinking clearly, being lucky, working harder than anyone else." But, still, there must be magic: 7 years old and eyeing the \$2 billion sales mark.

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Cover illustration: Daniel Kirk



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PAGE 17 At National Semi, a program to make college hires productive sooner also helps keep headhunters at bay and aims to cut attrition by 15%



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Growth spurt

If, in centuries to come, the electronics industry is to be remembered for anything special, it may well be remembered for the outrageous growth rates of its earlier days. The Apples and Compaqs and Suns are already legends in their own corporate lifetimes, and their fresh-faced founders and senior executives have become the new heroes of the business world.

ELECTRONIC BUSINESS caught on early that there was significance in using sales growth rates as measurements of performance — measurements that had almost as much cachet as sales and profit figures themselves. Some years ago, senior editor Linda Stallmann — she's the editorial heroine who plows through more annual reports than most people have had hot dinners — began the Sisyphean task of dissecting the data and averaging out five-year compounded annual growth rates.

Over the years, we've dug deeper into the league tables of figures that we've run. Linda analyzes them to produce some intriguing findings: which U.S. electronics industry sectors are hottest, which U.S. states are home to the most fast-growing electronics companies, that sort of thing.

But this year, we've worked harder to unearth a few more gems. Extra interpretations of some of the numbers, showing, for example, that the U.S. electronics industry is regenerating itself in a very healthy way.

Around the tables of fastest growing firms, we've built some powerful editorial that scrutinizes how some particularly fast movers have managed — and how others have mismanaged — their revenue growth.



Linda Stallmann, senior editor

Our excellent cover story by associate editor Barbara Berkman — how Scott McNealy kept Sun on track — makes compelling reading.

The British are coming!

That's the scoop from senior editor Bruce Rayner, whose investigations show that one or two major British distribution houses believe they can do it better than their U.S. cousins. One result: the Brits seem intent on acquisitions of U.S. regionals to prove the point. But as Bruce points out, they won't find that every little regional distributor is a pushover. To get control of their operating costs, many of the little guys are mounting impressive quality programs and some are even teaming to buy parts in bulk. That's the way to do it.

JOHN KERR, editor

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VBPB ABP

The fastest growing U.S. electronics companies

Sheer sales volume is impressive by any count, and if that revenue intake is accompanied by consistently large profits, then the company is deemed a success.

But the unique history of America's electronics sector has produced a third register of success: rate of sales growth. Just look at the awe that Compaq Computer Corp.'s track record commands: can a company that hurtles from nothing to more than \$2 billion in sales in seven years be considered anything but a hit?

By hitting \$111 million in sales for its first full year of business, Compaq became not only the fastest-growing company in the history of electronics, but in the history of American business. And it helped establish revenue growth as a valid performance gauge.

It also helped create awareness that the management of that growth makes many other executive challenges look like child's play.

ELECTRONIC BUSINESS recognized the value of a fast-growth measure four years ago, and launched what has become one of its most eagerly read features: its league tables of the top 100 fastest-growing U.S. companies.

The conditions are simple: the companies must be publicly held and U.S.-based, and must show six years of sales results because the figure we use is compounded annually for five

Top 10 fastest growing companies

1988 rank	Company	Five-year sales growth	Fiscal 1988 sales (\$ millions)
1	Sun Microsystems	161.2%	\$1,051.6
2	Oracle Systems	123.7%	282.1
3	3Com	121.3%	251.9
4	Novell	118.3%	281.2
5	AST Research	100.6%	412.7
6	Symbol Technology	88.0%	89.0
7	Micron Technology	87.0%	300.5
8	Mark IV Industries	79.6%	403.0
9	Compaq Computer	79.4%	2,065.6
10	Ashton-Tate	76.2%	307.3

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years of growth. And in their first year of business, they must have reached at least \$750,000 in sales (clearly, the smaller the first-year sales, the higher the growth rate. One dollar in first-year sales would produce a ridiculously high figure).

By those criteria, revenue racers such as disk-drive maker Conner Peripherals Inc. (which last year beat Compaq's first-year growth record) and PC powerhouse Dell Computer Corp. don't make our formal list.

This year, as usual, we break down the data by segment to show which industry areas were hot and which

less so. But we're taking the analysis a step further, unearthing facets that we feel are of considerable interest. We examine IBM's position in the tables; look at which states hosted the most fast movers; analyze why some companies climbed the rankings while others slid, and much more.

A few snapshots: most of the top 10 are computer or computer-related companies. Three of the 10 — Sun Microsystems Inc., Oracle Corp. and AST Research Inc. — are back, showing that they understand the rudiments of growth management. And two of the newcomers to the list — 3Com Corp. and Novell Corp. — show up as the fastest of the fastest, racing along in the PC connectivity rush.

The listings are complemented by the cover story which is much more of an

object lesson than a company profile. To the surprise of few, workstation supremo Sun hits the No. 1 slot for the second year running. Which raises the compelling business question: how exactly did chief executive officer Scott McNealy and crew manage it?

Managing growth, then, is the focus of this and the other strategy stories in the fastest growing section. And to round it off nicely, there's a few tips on growth management from the man who helped Intel Corp. and Apple Computer Inc. do it faster and better: Regis McKenna. □

Raising Sun

Sun is the undisputed U.S. sales growth leader for the second year running. Managing that growth has been, for CEO Scott McNealy, two parts freewheeling style, one part courage and a generous helping of luck. But as Sun keeps on growing, tight operating disciplines are tempering the zealous growth religion that once dominated

A morning of speech-making has left Scott McNealy tired, with no hint of the fraternity boy exuberance or wunderkind cockiness usually linked to Sun Microsystems Inc.'s top management. A 34-year-old chief executive who boasts about skipping one-half of his business school classes at Stanford, McNealy flashes slight impatience as a visitor asks him to analyze Sun's own management: How has McNealy managed the internal growth of a company that has raced along at a blistering five-year compound annual growth rate of 161%?

McNealy barks off his answer. "Look, the most difficult things to do when you're running a company are getting enough sleep. Thinking clearly. Having the courage to make tough decisions. Being lucky. Working harder than anyone else. There's no magic to it."

But there is a magic to Sun. Under McNealy, Sun has become one of Silicon Valley's more remarkable success stories. After only seven years, Sun has positioned itself as the workstation industry leader and seen sales approach the \$2 billion mark. In the first half of the 1989 fiscal year ended June 30, Sun had a net income of \$50 million on revenue of \$837 mil-

lion. Fueling Sun's growth was its early recognition of industry trends: the move away from proprietary host-based computer systems toward networks of desktop computers incorporating open industry standards.

Silicon Valley's Tom Hanks

But Sun's most astonishing performance has been offstage: managing the support systems that have kept the company from cracking under the tremendous stress of growth. Sun shot into a behemoth while still in its gangly adolescence, a Tom Hanks in Silicon Valley's own version of "Big." Says McNealy: "Sun is like a 7-foot-3-inch 13-year-old." McNealy's colossus exists because of his single mission for Sun: grabbing more market share. What McNealy values is the institutionalization of growth.

"From day one, it was an understanding that they'd be a multibillion dollar company, or they'd fail totally," says Stanley M. Davis, a Boston-based author who is writing a Sun-sponsored book on the information society. McNealy's "explicit vision," says Davis, has been, "we have to be big fast, or fail."

Sun has yet to hit the hurdles that would trip its nonstop growth. Observers, though, say those hurdles will

Daniel Kim

BY BARBARA N. BERKMAN

come soon for the Mountain View firm, as Sun faces hotter competition — especially from a Hewlett-Packard Co. emboldened by its Apollo Computer Inc. buy — margin pressure for its new low end sub-\$1,000 products and a continuing battle to win acceptance for its Spare processor design.

Managing Sun for the past seven years has been managing change. At various points, Sun has outgrown its staff's capabilities, its MIS system, its phone system, its facilities, its marketing and customer support. Outside observers have watched Sun do battle with its competitors and wrestle away market share each year. But internally, Sun waged its own private campaign to keep from being crippled by its own life support systems. Several Sun botched, including:

- An MIS system appropriate for a company one-quarter Sun's size;
- Lax fiscal controls that let inexperienced managers run departments like autonomous fiefdoms;
- Inadequate allocation of resources to customer support.

Yet Sun has certainly managed many aspects of its internal growth well, or it wouldn't top *ELECTRONIC BUSINESS'* list of fast-growth companies. Its best accomplishments:

- Assimilating hordes of outsiders into Sun's fast-growth culture;
- Intuitive timing in raising capital;
- In manufacturing, curtailing capacity to keep up with quality control; farming out manufacturing; whittling down the number of suppliers to around 100.

Why did Sun pinch pennies on customer service and information systems? McNealy never stepped back from allocating resources to technology, typically spending 12% to 14% of revenue on R&D. That hefty allocation to technology has left a much smaller slice of the resource pie for operating expenses.

Grabbing a Magic Marker, McNealy moves from a small round conference table to the one white plastic wall of his office meant for impromptu illustrations. He draws a chart with two rising lines: one is revenue, the lower one is operating

expenses. His point is obvious: While Sun's revenue has doubled in some fiscal years, if McNealy proportionately allocated twice as much to operating expenses, Sun would run at a loss. "It's a horrible tightrope. Running a company is finding out what you can afford not to do," says McNealy. For seven years, McNealy and Sun have been making do.

The result: Sun underinvested in support. "Hundreds of crises we solved internally. We never hit the wall. But we had quality problems, customer problems, every problem you could ever imagine," says David Marquardt, a Sun venture capitalist with TVI Management, and a direc-

conservatism? Crawford Beveridge, vice president for human resources, argues the latter. "We're just now being weaned off the HPs. In fact, that's taken us to a \$2 billion company. It was an amazingly forward-thinking decision."

Still, Sun has lived with the consequences of McNealy's 1983 selection for six years. "There are times our MIS system is ready to explode because of the order rate," observes Edward Zander, Sun's marketing VP recruited from arch rival Apollo Computer Inc. in 1987. "And the telephone, which was ready to blow up with the trunk lines in here, ... But we haven't blown a fuse yet."

Growth problems have plagued McNealy since he cofounded Sun in 1982 with Vinod Khosla, who retired some two years later; software genius Bill Joy, now vice president for R&D; and Andreas Bechtolsheim, who remains as Sun's vice president for technology. Only Khosla, a founder of Daisy Systems Corp., had been through the demands of managing a fast-growth company.

McNealy joined Sun as head of manufacturing. What McNealy and company learned about management they absorbed in two ways — by making mistakes, and by bringing

on experienced managers from Digital Equipment Corp., as well as from Sun rivals Apollo and Apple Computer Inc. The most senior was Bernard Lacroute, arriving in 1983 from DEC. He is now Sun's executive vice president, a powerful back-room presence to McNealy's exuberant style.

Mixture for success

Oddly, the amalgam of corporate cultures mixed well at Sun. From the start, McNealy encouraged participatory management that allowed quick-fire decision making. "After the \$100 million mark, we see the role of Scott changing from entrepreneur to manager. Scott did a very good job of letting go of the details. He was a beacon [of Sun's culture], spreading 'this is what my company is built on,'" says John Dunkle, vice president of WorkGroup Technologies in

"Look, the most difficult things to do when you're running a company are getting enough sleep. Thinking clearly. Having the courage to make tough decisions. Being lucky. Working harder than anyone else. There's no magic to it."

—Scott McNealy

tor since 1982. "MIS turned out to be an almost crippling thing to the company later on," he adds.

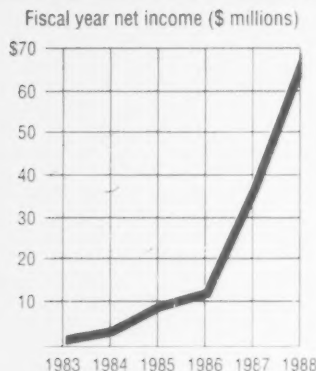
Fighting MIS fires

While Sun fought other fires, investment in systems went overlooked. In 1983, as a \$9 million company with some 90 employees, Sun installed an MIS system using Ask Computer Systems software run on a Hewlett-Packard Co. model 3000 computer. For a company of that size, it was a fairly costly investment of about \$1 million. But Ask software is targeted for companies of not more than \$500 million, and as Sun grew, it was forced to split databases until abandoning the system entirely in April (Sun replaced the MIS, at an estimated investment of \$15 million to \$20 million.)

Was McNealy's choice of MIS a sign of short-range planning or fiscal

Sun Microsystems: From small workstations mighty systems grow

Net income soars



Growth highlights

December 1988 — Groundbreaking on first offshore manufacturing plant in Scotland

June 1988 — Total leased space reaches 1,789,000 square feet
— Purchased first building, adding 236,000 square feet

April 1988 — Sun introduces the Sun386i workstation priced at \$7,990
— Sun, AT&T and Xerox announce Open Look graphical user interface

January 1988 — AT&T agrees to purchase over three years, up to 15% of Sun's outstanding stock at a 25% premium over market value, plus 5% on the open market

November 1987 — Launches VAR program to broaden distribution

October 1987 — Licenses Sparc RISC processor to AT&T; AT&T announces joint development plan for Unix

July 1987 — Introduces the Sun-4, the first 10-MIPS supercomputing workstation based on Sparc, priced at \$39,900

June 1987 — Direct selling network reaches 400 worldwide

February 1987 — \$100 million bond offering

November 1986 — Second stock offering raises \$87 million

March 1986 — Initial public offering raises \$45 million

September 1985 — Introduces the Sun-3 generation, priced at \$12,900 for the Sun 3/75 desktop workstation; \$20,900 for 3/160

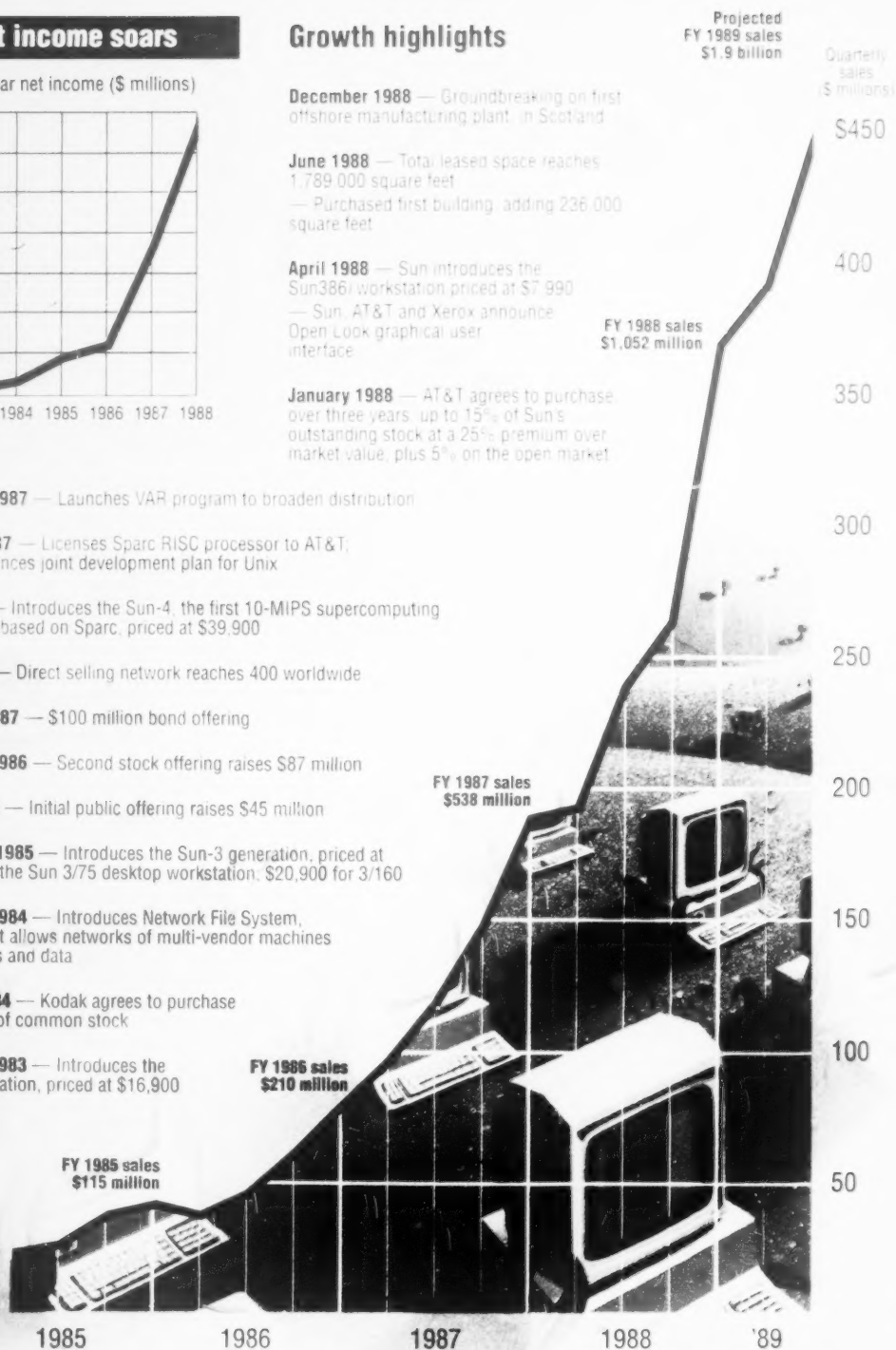
November 1984 — Introduces Network File System, software that allows networks of multi-vendor machines to share files and data

October 1984 — Kodak agrees to purchase \$20 million of common stock

November 1983 — Introduces the Sun-2 generation, priced at \$16,900

FY 1984 sales
\$39 million
FY 1983 sales
\$9 million

Fiscal years
ending June 30



Sources: ELECTRONIC BUSINESS, Sun Microsystems Inc.

STRATEGIES

FASTEST GROWING COMPANIES

Hampton, N.H., a market research firm. As McNealy describes it, "I try to make as few decisions as possible."

For McNealy, institutionalizing growth meant crafting a fluid organization: buying and not leasing facilities; contracting out much of the manufacturing; raising capital not when the need was pressing but when the market was right. It meant luring executives who already knew how to run billion dollar companies to Sun, then only a \$9 million to \$40 million firm. "Scott didn't have enough experience to know you couldn't do things. And so he hired himself these industry veterans, and then he said, 'here's what we're going to do,'" explains Beveridge.

There's no question Sun's constant start-up pace has come at a price: higher attrition. Over three years, annual labor turnover crept from 9% to more than 11.5% now. Stress has taken its toll, and workers increasingly complain a company can't run the way Sun runs. When Sun was young, McNealy dealt with such symptoms by gathering everyone together for a pep talk. But last April, Beveridge says Sun "collected thoughts on the state of morale." It responded with a Quality of Life plan designed to get people back in touch with Sun's mission and strategy. The goal? To revive the place's old start-up feel.

It seems an unusual move for Sun to embrace the stability of the past. Its organization has always been fluid, flexible, dismantled one day and reassembled the next. "We get a lot of rap about our organization. I couldn't draw you an org chart if I tried.... We must reorganize something every quarter," says Zander. Sun executives are fond of repeating McNealy's stable of business axioms. Zander's offering: "Never let the organization get in the way of opportunity."

That spelled autonomy — a philosophy that paid off for Sun. "The problem

with all that growth is it requires a kind of flexibility to roll with the events as they come and seek out opportunities a more rigid organization wouldn't have pursued," says Mark Stahlman, an analyst with Sanford C. Bernstein & Co. Sun, for example, introduced its family of 386i workstations in April 1988 only after rounds of internal debate among divisions. "If it hadn't been for fairly decentralized power [Sun] would probably have missed the most successful product launch in Sun's history."

McNealy's penchant for organizational change has let him willingly trade upheaval for innovation. Early in 1985, when Sun was a 900-employee company with sales approaching \$115 million, McNealy held a series of meetings on launching the company into additional markets.

Adolescent Sun: How wild-and-crazy worked in the past

- Participatory management allowed quick decision making
- Autonomy for individual managers permitted the opportunistic April 1988 launch of Sun's successful 386i workstation
- Flexible staffing structure: By putting all able bodies on the Sun-3 project, Sun met the September 1985 launch deadline
- Leasing buildings enhanced flexibility
- McNealy's pep talks at beer blasts kept the mission clear

Grown-up Sun: A dose of discipline

- Since mid-1987, tight financial controls have been implemented. Five-year macro forecasts have replaced six-month outlooks
- Three-inch thick "Financial Policy Manual" helps limit Sun's exposure to bad deals
- Manager's compensation became linked to performance in 1987
- The hiring process has been automated. An AI-based computer system analyzes and distributes resumes
- Sun's now buying and building facilities in the United States and overseas
- A formal Quality of Life plan has been designed to revive a sense of mission

When McNealy felt his managers were letting too many projects fall to the bottom of their lists, he revamped their priorities. McNealy announced the creation of four autonomous divisions corresponding to four new markets: low-end products; software; the federal government; and customer service as a profit center.

Deploying able bodies

Sun's informal hierarchy offered another advantage — the flexibility to meet tighter operating costs during the summer of 1985, a recessionary period for the industry. Throughout the summer months, Sun raced to meet the Sept. 9 product introduction date for its family of Sun-3 computers. But during that quarter Sun clamped down on hiring, and met the introduction date only by shifting people to the important product launch. "We took all able bodies," recalls Carol Bartz, recently named vice president of the customer service division and a longtime Sun veteran. "A rigid hierarchy wouldn't have been able to do it."

Maybe so. But Sun's loose, free-wheeling style is in many ways a two-edged sword. For managers, it made Sun's fast-growth pace livable. Take John Hime, a former Sun marketing manager: "I always had the feel they let me run my own little business. You can deal with the stress when the control is yours." But while autonomy let Sun managers make decisions quickly, autonomy itself was stressful. Sun's fast growth forced its managers to shoulder far more responsibility and decision-making than their counterparts at slow-growth companies.

Autonomy, for example, nearly destroyed the sets of checks and balances most companies live by. "The planning function at Sun three years ago was laughable. It was amazing a \$500 million company was flying blind," says Austin Wing Mayer, director of investor relations. When Mayer joined in 1987, he recalls "there was no accountability for profits and loss; no sense of responsibility in terms of any hiring plan."

At the time Mayer came on board, he says Sun typically made financial forecasts just six months ahead. Only now, with signs such as the recent hiring of Sun's first director of corporate planning and strategy, is the discipline of casting five-year plans

catching on. "Since I've been here, we've actually looked out to the early 1990s in terms of macro revenue, employee business models and marketing," adds Zander.

Sun's era of tighter financial controls began when Joseph Graziano, Apple's former financial officer, took the reins from the retiring Bob Smith in May 1987. Sun instituted some tough cash flow objectives, like slashing the days of outstanding receivables from 55 down to 48 in a year's time. In 1987, Sun announced a policy change that stunned homegrown managers accustomed to freewheeling autonomy: Compensation was suddenly performance-linked. Managers who only delivered on seven of the 10 objectives on their lists, for example, would be eligible for 70% of their bonuses. Mayer calls the reaction "pretty rocky going."

"I can remember sitting in on some operating committee meetings," he says, "where the managers were very resentful of someone looking over their shoulder and dictating to them how much they had, and they had to account for that money. The managers really fought back."

It's confounding why Sun didn't simply jettison the managers. According to Mayer, there were several cases where "managers would go out and find a multi-million dollar deal and it never got elevated to the proper levels of the company. It never got reviewed by legal counsel. . . [they] didn't realize we didn't have the cash on our balance sheet to finance it."

Dangerous autonomy

Few companies would tolerate such dangerous autonomy: Sun ap-

parently agrees. Although Mayer says the deals — which he declined to identify — turned out well, he points to a Financial Policy Manual, some 3 inches thick, dated September 1988. "We are trying to limit the company's exposure to bad deals."

Indeed, there are signs of a changing Sun. Lightning decision-making was once its pride, but now Sun is slowing down. Says McNealy: "We shouldn't respond to situations as quickly as in the past." There's no doubt that Sun's approach to managing growth is changing, as McNealy explains. "As we've gotten bigger, we say 'no' to a lot more things."

For the first time, Sun is also leaping to fix another consequence of fast growth: its slapdash customer support.

McNealy admits customer support "just got away from us." Recently,

Population explosion: 7,000 new hires in five years

How does a fast-growth company hire and assimilate about 7,000 people in five years? Not easily. Sun Microsystems Inc. dealt with the challenge by introducing a video on recruiting by president Scott McNealy. The purpose, says Crawford Beveridge, vice president for human resources, is to make managers understand "this was an absolutely critical part of what they could do for Sun." Recruiting has been a constant challenge: in five years, Sun grew from 1,200 to 8,900 employees. Beveridge estimates the company receives 300 resumes daily, and reads five for each person interviewed; that's roughly 38,500 resumes in five years.

Initially, Sun spent huge sums on outside recruiters who charged 15% to 20% commissions on each hire's first year salary. Sun resisted an in-house recruiting staff to avoid having excess people on payroll when recruiting slackened. But it never did. "In retrospect, it wasn't the best call in the world," allows Beveridge. Sun wised up in 1985, when it slashed costs by hiring roughly 20 contract recruiters.

One of Sun's most forward-looking moves has been automating recruiting with Resumix, a \$60,000 artificial intelligence-driven Unix-

based software package. Previously, human resources reproduced some 30 copies of each resume and distributed them to Sun divisions. The AI system, says Beveridge, "would have been absolutely useless to us four years ago. It would have been a lot faster to walk across to the other building." Installed this year, Resumix scans resumes and enters them into the Sun network both verbatim and in a summarized form that highlights, for example, knowledge of programming languages. Managers access the sys-

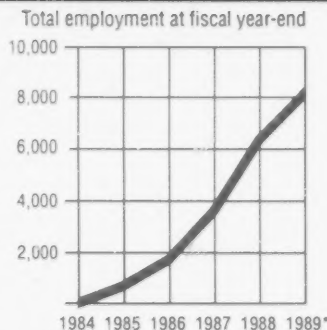
tem and key in the type of experience they need, and out pop the appropriate resumes.

As Sun's population exploded, the company managed growth in two ways. First, assimilating new hires began at the front end by weeding out "un-Sunlike" candidates at the first interview. "Over the years, you know who fits in, and they're not from slow-growth companies," says Carol Bartz, a vice president who has been with Sun for more than five years. "I do a sanity/culture check. 'Do you know what a wild and crazy and hard-working place Sun is?' You know when to dig more on the question."

As well, Sun routinely hired people overqualified for the job they were hired to perform. That kind of strategic hiring keeps people's abilities in step with Sun's fast growth, but the screening process can consume as much as one-quarter of a manager's time.

In late 1985, Sun began its first formal employee orientation; it is still taught by McNealy, assisted by vice presidents. Sun took its first steps into management training and career development in 1986. The pattern is clear: Sun is beginning to take on the trappings of a more mature company. □

Sun's growing people power



Fiscal years ending June 30

* Feb. 1989

Source: Sun Microsystems Inc.

the problem exploded. Callers to Sun's toll-free number wouldn't hear back from the company for days at a time. Complaints about the lack of immediate attention escalated; Sun responded by training and nearly doubling the number of people handling calls. "We aren't perfect about anticipating problems. This one got out of hand," says Bartz.

Historically, spending on customer support took a backseat to R&D expenses. Only now is the ratio changing. Sun's reined in hiring sales representatives. Now, about 10% of new hires are in customer service, compared with 20% in sales and marketing. That reallocation of resources, says Bartz, is typical of Sun's approach to managing growth.

Adding more support workers, though, will add to another tricky problem for Sun: assimilating outsiders. Communicating Sun's vision was easy back when it was a 300-employee company. Then, McNealy stood on a chair at Sun's routine beer blasts and delivered rousing reminders of Sun's mission. But Sun's phenomenal growth has robbed McNealy of that ease of communication. One of his trickiest problems has been preserving Sun's culture. Instead of speaking from a chair, McNealy now communicates to a camera lens in quarterly videos on strategic issues, problems and solutions.

Senior managers who didn't understand McNealy's vision of Sun are gone. First was Owen Brown, who re-

signed in 1984, about a year after being recruited from DEC as Sun's president. "You've got to understand the culture of a company. The leader has got to understand it," says board member Marquardt. Yet remarkably few senior managers from Sun's fledgling days have left.

"In seven years, with all the money that's been made here — just check out the parking lot with those cars — all those guys like [VP for sales] Joe Roebuck, the original sales team are all in place," notes marketing vice president Zander. (Sun's merit stock plan covers 1,000 employees; almost 80% of eligible employees participate in its stock purchase plan).

They've stayed, perhaps, because there's plenty of things that Sun has managed well. Among them — manufacturing, where forecasting was made easier by fairly steady increases in demand. Yet as Sun moves into product diversification, the balancing act is getting tougher. Now, there's pressure on Sun to stockpile inventory for both old and new products. Inventory, \$15.7 million last September, had ballooned to \$23.4 million at year-end. About three years ago, Sun started just-in-time manufacturing and slashed its vendors from a couple of hundred to its current stable of under 100.

Sun manufactures its products in Milpitas, Calif., (450,000 square feet) and in Westport, Mass., (180,000 square feet). From the beginning, Sun built flexibility into its manufacturing by resisting vertical integration. "We spent a large amount of time understanding what our backlog would look like," says James Bean, V.P. of manufacturing. Sun contracts out circuit board stuffing, and purchases some completed assemblies.

That flexibility extends into facilities planning. Favoring the flexibility of leasing in light of its growth, Sun didn't purchase its first building until mid 1988. Last year, it broke ground on its first offshore manufacturing plant in Scotland. Within the next six months, Sun will also evaluate whether it will produce in Japan.

Sun hasn't abandoned the flexibility that allowed it to successfully manage growth to the \$2 billion mark. But more than ever, Sun is embracing discipline as a more mature company might. Sun's old cockiness? It may be obsolete. "Discipline," says McNealy, "is not a stuffy word." □

Feeding Sun's cash-hungry appetite

Sun Microsystems Inc., with an annual compound growth rate of 161%, has a voracious appetite for cash. Yet because of savvy financing and strategically timed stock and bond offerings, Sun always has had enough cash in the coffers. "Cash has not been a major problem, so obviously they've done it well," says Robert Long, a vice president of Eastman Kodak Co. and a Sun director since April 1988.

Sun has been very careful not to tie up too much capital in fixed assets. In manufacturing, Sun contracts out much of its assembly work. Fluidity is built into its facilities planning as well. Sun leased buildings for years until taking the plunge into ownership in 1988.

"Sun thinks ahead about cash needs and comes up with unique ways of meeting them," adds Long. Among them: In October 1984, about 18 months after Sun went public raising \$45 million, Kodak, a major customer, purchased \$20 million of Sun common stock. But Sun's deal with AT&T was even sexier.

In fiscal 1988, rapid expansion made Sun devour \$12 million in cash monthly. To guarantee long-term working capital, Sun struck a deal with AT&T: over three years, the OEM would purchase newly issued common stock of up to 15% of Sun's outstanding

shares. Best yet, Sun would sell the shares at a 25% premium over market value. AT&T also had the option to purchase another 5% of Sun's stock in the open market.

It was a plum arrangement for Sun. AT&T's premium-priced stock was a very creative strategy negotiated by Sun president Scott McNealy and financial officer Joseph Graziano. John Rohal, an analyst with Alex. Brown & Sons Inc., calls the financing "a spec-

In fiscal '88, growth made Sun eat \$12 million monthly

tacular deal for them." AT&T is an internal consumer of compilers, an OEM and "a friendly holder of stock." More importantly, adds Rohal, "Sun has a guaranteed availability of stock through 1991."

But not all is bliss. AT&T agreed to the deal at the start of the war over Unix, when alliances over AT&T's version of the operating system were critical. Now, although financially committed to Sun, AT&T appears to be distancing itself from Sun's technology, particularly its Sparc microprocessor. □

Facts behind the figures

The following pages comprise ELECTRONIC BUSINESS' special report on fast-growing U.S. electronics companies. The 100 companies listed are all publicly held and are ranked in order of their compounded annual growth rates, calculated over a five-year time span on six years of reported revenue results.

Additional analysis examines the growth rates of particular industry segments, with comparisons with the previous year. ELECTRONIC BUSINESS breaks out the U.S. states with the largest number of fast-growth firms; highlights the corporations with sales in the billions of dollars which still manage to achieve impressive sales gains; examines which companies climbed the fastest growth charts, and why; and looks at where IBM has placed over the past few years.

Top 10 fastest growing companies

1988 rank	Company	Market	Five-year sales growth	Fiscal 1988 sales (\$ millions)
1	Sun Microsystems	Workstations	161.2%	\$1,051.6
2	Oracle Systems	Database software	123.7%	282.1
3	3Com	LAN equipment	121.3%	251.9
4	Novell	LAN software	118.3%	281.2
5	AST Research	Boards and PCs	100.6%	412.7
6	Symbol Technology	Bar code scanners	88.0%	89.0
7	Micron Technology	Semiconductors	87.0%	300.5
8	Mark IV Industries	Diversified	79.6%	403.0
9	Compaq Computer	Microcomputers	79.4%	2,065.6
10	Ashton-Tate	Database software	76.2%	307.3

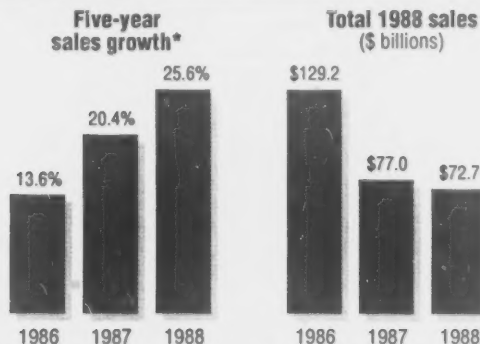
Faster growth, smaller companies

In 1988, the top 100 fastest growing U.S. electronics companies had a five-year compounded annual growth rate of 25.6%. That marked an increase over 1987's 20.4% climb — and a result that might

appear puzzling given that the industry is maturing. But even though the growth rate accelerated, the total revenue declined from \$77.0 billion to \$72.7 billion in the same period.

One conclusion? The industry is regenerating healthily, as more small companies made the list.

The overall picture



* Compounded average annual growth rate

New entries to the fastest growing list

Company	Five-year sales growth	Fiscal 1988 sales (\$ millions)	1988 rank
3Com	121.3%	\$251.9	3
Novell	118.3%	281.2	4
Symbol Technologies	88.0%	89.0	6
Compaq Computer	79.4%	2,065.6	9
Computer Associates	64.9%	709.1	17
Rexon	63.6%	155.5	19
Hutchinson Technology	47.8%	113.7	30
Valid Logic Systems	46.5%	108.4	32
Xicor	41.8%	90.1	36
KLA Instruments	37.0%	112.9	39

New guys in town

New to the list are 26 firms, with at least one surprise among them. 3Com and Novell head the top 10 newcomers, and their position owes more to the market they drive — small computer connectivity — than to their own youth. Software behemoth Computer

Associates is getting big by buying company after company. And KLA Instruments is, on the face of it, the surprise: a fast-growing IC production equipment maker?

KLA is most active in optical inspection techniques. Its ranking is an indication that quality is uppermost in the minds of managers these days.

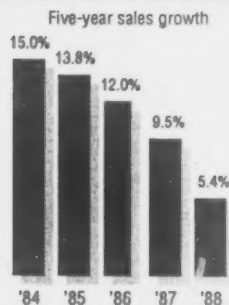
STRATEGIES

FASTEST GROWING COMPANIES

Where's IBM?

Big Blue once made the fastest growing list: in the heyday of the PC, it showed up with 15% average annual growth. Not anymore. IBM last year produced a 5.4% sales gain — evidence that it has lost steam in PC markets and that mainframe and mini-computer sales have yet to regain momentum.

IBM's slide



Billion dollar companies keep on ticking

Company	Fiscal 1988 sales (\$ millions)	Five-year sales growth	1988 rank
DEC	\$11,475.4	21.9%	69
Unisys	9,902.0	18.2%	82
Hewlett-Packard	9,831.0	15.9%	100
Apple Computer	4,071.4	32.9%	44
Intel	2,874.8	20.7%	74
Compaq Computer	2,065.6	79.4%	9
Amdahl	1,801.8	18.3%	81
Prime Computer	1,594.6	25.3%	61
Loral	1,440.8	36.0%	40
Tandem Computers	1,314.7	25.7%	59
Seagate Technology	1,266.0	62.9%	21
Advanced Micro Devices	1,125.9	25.7%	60
Sun Microsystems	1,051.6	161.2%	1

The billionaires are still bountiful

You'd think that giant corporations with sales in the billions of dollars would be pushed to grow much at all. But 13

of the billion-dollar-plus club made the lists. Several others didn't cut it, among them: Amp (12%); E-Systems (13%); Motorola (13%); Tandy (11%); Wang (15%); and Zenith (15%). The figures are for five-year compounded growth.

California gold rush; Mass. misery

The Golden State holds its previous year's lead as the state with the most revenue racers. Last year, 41 of the fastest called California home — the same as in 1987. New England reflects the erosion of the "Massachusetts Miracle;" the Route 128 score is 11, down from 14 a year earlier.

Of the 26 newcomers to the lists, California claims seven, but New York (5), Minnesota (3) and Texas (2) are inching up.

Hot growth spots

Number of companies on the 100 fastest growing list

Calif.	41
Mass.	11
N.Y.	8
Minn.	6

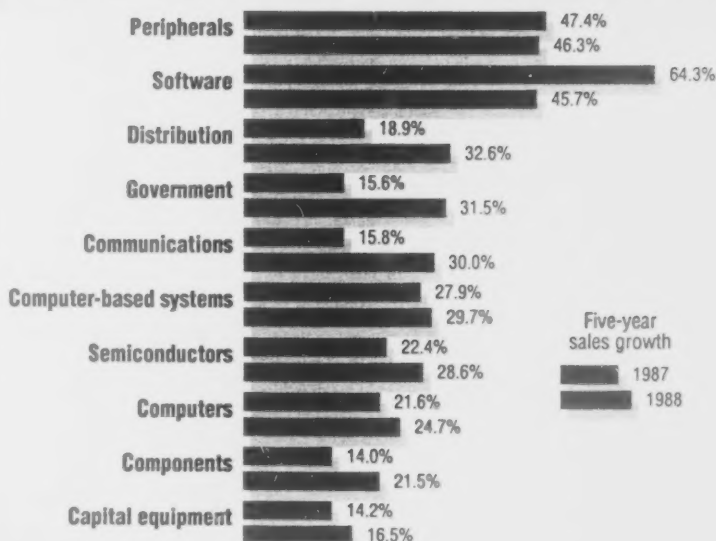
Peripherals makers head hot-growth pack

Makers of computer peripherals products scored the highest collective average growth rate — 46.3%, followed by the previous year's top-ranked sector, software firms, with 45.7% compounded annually.

Software sector growth has backed off some: in 1987, it showed 64.3%, which means that the business is maturing and consolidating. But, software shows more companies: nine in this year's lists, compared with six in 1987. Oracle Corp., developer and marketer of relational database management systems, led the pack of software companies with a five-year compounded average annual growth rate of 123.7%, making it one of the fastest growing software companies.

Comparing the weighted averages for 1987's versus 1988's five-year compounded average annual growth, all segments showed an improvement except for software.

Peripherals companies the fastest growing segment



Electronic Business

1988's fastest growing U.S. companies

1988 rank	Company	Five-year sales growth*	Fiscal 1988 sales (\$ millions)	Fiscal 1988 profits (\$ millions)	Fiscal year ended	Location
1	Sun Microsystems	161.2%	\$1,051.6	\$66.4	6/88	Mountain View, Calif.
2	Oracle Systems	123.7%	282.1	42.9	5/88	Belmont, Calif.
3	3Com	121.3%	251.9	22.5	5/88	Santa Clara, Calif.
4	Novell	118.3%	281.2	30.4	10/88	Provo, Utah
5	AST Research	100.6%	412.7	15.1	6/88	Irvine, Calif.
6	Symbol Technologies	88.0%	89.0	20.2	6/88	Bohemia, N.Y.
7	Micron Technology	87.0%	300.5	98.0	8/88	Boise, Idaho
8	Mark IV Industries	79.6%	403.0	17.0	2/88	West Amherst, N.Y.
9	Compaq Computer	79.4%	2,065.6	255.2	12/88	Houston, Texas
10	Ashton-Tate	76.2%	307.3	47.8	1/88	Torrance, Calif.
11	Iomega	73.6%	111.5	8.6	12/88	Roy, Utah
12	Wyse Technology	73.3%	456.6	28.0	3/88	San Jose, Calif.
13	Western Digital	72.6%	768.3	43.0	6/88	Irvine, Calif.
14	Stratus Computer	66.8%	265.3	29.3	12/88	Marlboro, Mass.
15	QMS	66.5%	186.7	-5.0	9/88	Mobile, Ala.
16	Intelligent Systems	65.1%	152.6	-9.0	12/88	Norcross, Ga.
17	Computer Associates	64.9%	709.1	101.8	3/88	Garden City, N.Y.
18	Microsoft	63.8%	590.8	123.9	6/88	Redmond, Wash.
19	Rexon	63.6%	155.5	9.0	9/88	Culver City, Calif.
20	Mentor Graphics	63.4%	300.8	33.5	12/88	Beaverton, Ore.
21	Seagate Technology	62.9%	1,266.0	77.3	6/88	Scotts Valley, Calif.
22	LSI Logic	61.2%	378.9	23.8	12/88	Milpitas, Calif.
23	Digital Communications Assoc.	59.9%	227.5	42.2	6/88	Alpharetta, Ga.
24	Lotus Development	54.6%	468.5	58.9	12/88	Cambridge, Mass.
25	Apollo Computer	52.0%	653.5	0.2	12/88	Chelmsford, Mass.
26	Archive	51.7%	122.7	10.5	9/88	Costa Mesa, Calif.
27	MiniScribe	51.1%	603.3	25.9	12/88	Longmont, Colo.
28	Symbolics	50.8%	81.3	-46.0	6/88	Cambridge, Mass.
29	Emerson Radio	50.3%	728.8	-12.0	3/88	North Bergen, N.J.
30	Hutchinson Technology	47.8%	113.7	4.3	9/88	Hutchinson, Minn.
31	Micropolis	46.9%	353.1	-19.4	12/88	Chatsworth, Calif.
32	Valid Logic Systems	46.5%	108.4	6.1	12/88	San Jose, Calif.
33	Daisy Systems	46.4%	117.4	6.9	9/88	Mountain View, Calif.
34	VLSI Technology	43.9%	221.2	6.7	12/88	San Jose, Calif.
35	Anthem Electronics	43.7%	264.6	11.3	12/88	San Jose, Calif.
36	Xicor	41.8%	90.1	14.0	12/88	Milpitas, Calif.
37	Silicon Systems	39.8%	120.8	12.7	9/88	Tustin, Calif.
38	Ultimate	39.8%	209.2	13.0	4/88	East Hanover, N.J.
39	KLA Instruments	37.0%	112.9	8.8	6/88	Santa Clara, Calif.
40	Loral	36.0%	1,440.8	74.3	3/88	New York, N.Y.
41	Quantum	35.2%	188.5	-3.2	3/88	Milpitas, Calif.
42	Cray Research	34.8%	756.3	156.6	12/88	Minneapolis, Minn.
43	SCI Systems	33.5%	774.2	19.0	6/88	Huntsville, Ala.
44	Apple Computer	32.9%	4,071.4	400.3	9/88	Cupertino, Calif.
45	Intermec	31.9%	85.2	5.2	3/88	Lynnwood, Wash.
46	Telxon	30.6%	123.9	14.0	3/88	Akron, Ohio
47	BancTec	30.5%	93.4	6.4	3/88	Dallas, Texas
48	Emulex	29.5%	125.1	9.1	6/88	Costa Mesa, Calif.
49	Ask Computer	29.3%	142.4	10.8	6/88	Los Altos, Calif.
50	Instrument Systems	29.1%	381.1	6.1	10/88	Jericho, N.Y.

* Compounded average annual growth rate

(Continued)

Electronic Business

1988's fastest growing U.S. companies

1988 rank	Company	Five-year sales growth*	Fiscal 1988 sales (\$ millions)	Fiscal 1988 profits (\$ millions)	Fiscal year ended	Location
51	Bolt Beranek and Newman	29.0%	\$305.2	\$18.1	6/88	Cambridge, Mass.
52	LTX	28.3%	174.8	7.0	7/88	Westwood, Mass.
53	Richardson Electronics	28.2%	118.3	11.2	5/88	La Fox, Ill.
54	Applied Materials	28.0%	362.8	40.0	10/88	Santa Clara, Calif.
55	Microsemi	27.9%	83.7	2.5	9/88	Santa Ana, Calif.
56	Marshall Industries	26.4%	420.4	17.6	5/88	El Monte, Calif.
57	Intergraph	26.0%	800.2	88.0	12/88	Huntsville, Ala.
58	Data Switch	25.8%	113.8	3.3	12/88	Shelton, Conn.
59	Tandem Computers	25.7%	1,314.7	94.5	9/88	Cupertino, Calif.
60	Advanced Micro Devices	25.7%	1,125.9	19.3	12/88	Sunnyvale, Calif.
61	Prime Computer	25.3%	1,594.6	19.0	12/88	Natick, Mass.
62	Applied Magnetics	23.6%	293.0	23.7	9/88	Goleta, Calif.
63	Molex	23.3%	502.4	59.3	6/88	Lisle, Ill.
64	Diceon Electronics	23.1%	140.7	9.9	9/88	Irvine, Calif.
65	Network Systems	22.8%	131.5	11.4	12/88	Minneapolis, Minn.
66	Systematics	22.8%	179.5	15.4	8/88	Little Rock, Ark.
67	Dynatech	22.3%	367.8	24.5	3/88	Burlington, Mass.
68	American Management Systems	21.9%	213.3	7.4	12/88	Arlington, Va.
69	DEC	21.9%	11,475.4	1,305.6	6/88	Maynard, Mass.
70	Burr-Brown	21.8%	176.7	11.5	12/88	Tucson, Ariz.
71	Vishay Intertechnology	20.9%	109.0	15.5	6/88	Malvern, Pa.
72	Micom Systems	20.8%	223.4	9.8	3/88	Simi Valley, Calif.
73	Cullinet Software	20.7%	216.7	-47.0	4/88	Westwood, Mass.
74	Intel	20.7%	2,874.8	452.9	12/88	Santa Clara, Calif.
75	AVX	20.5%	408.9	27.6	12/88	Great Neck, N.Y.
76	Norstan	20.1%	85.9	2.4	4/88	Plymouth, Minn.
77	Dynamics Research	19.1%	92.9	4.1	12/88	Wilmington, Mass.
78	Finnigan	18.8%	130.7	8.2	12/88	San Jose, Calif.
79	Altos	18.7%	175.9	22.2	6/88	San Jose, Calif.
80	ADC Telecommunications	18.7%	179.9	17.0	10/88	Bloomington, Minn.
81	Amdahl	18.3%	1,801.8	213.8	12/88	Sunnyvale, Calif.
82	Unisys	18.2%	9,902.0	680.6	12/88	Detroit, Mich.
83	General DataComm	18.1%	196.2	-18.4	9/88	Middlebury, Conn.
84	Sheldahl	17.8%	83.9	0.5	7/88	Northfield, Minn.
85	Cipher Data Products	17.7%	185.4	10.4	6/88	San Diego, Calif.
86	Gerber Scientific	17.7%	264.0	29.6	4/88	South Windsor, Conn.
87	Park Electrochemical	17.6%	128.1	7.0	2/88	Lake Success, N.Y.
88	Diasonics	17.6%	281.6	9.8	12/88	South San Francisco, Calif.
89	Priam	17.5%	142.0	0.5	6/88	San Jose, Calif.
90	Recognition Equipment	17.4%	260.8	-12.2	10/88	Dallas, Texas
91	AEL Industries	17.3%	119.6	2.1	2/88	Landsdale, Pa.
92	Cherry	17.3%	194.6	7.4	2/88	Waukegan, Ill.
93	Zeus Components	17.3%	98.5	0.9	9/88	Port Chester, N.Y.
94	Measurex	16.7%	265.2	37.1	11/88	Cupertino, Calif.
95	Pioneer-Standard	16.5%	254.6	5.2	3/88	Cleveland, Ohio
96	ISC Systems	16.5%	170.8	8.2	6/88	Spokane, Wash.
97	Evans & Sutherland	16.4%	129.6	1.9	12/88	Salt Lake City, Utah
98	Management Science America	16.3%	250.0	-33.6	12/88	Atlanta, Ga.
99	Logicon	16.2%	218.9	9.1	3/88	Torrance, Calif.
100	Hewlett-Packard	15.9%	9,831.0	816.0	10/88	Palo Alto, Calif.

* Compounded average annual growth rate

Source: ELECTRONIC BUSINESS

Electronic Business

1988's fastest growing U.S. companies by industry segment

Five-year growth*				Five-year growth*				Five-year growth*			
Sales		Profits		Sales		Profits		Sales		Profits	
		rank				rank				rank	
Capital equipment				Computer-based systems (continued)				Peripherals (continued)			
KLA Instruments	37.0%	24.7%	39	Recognition Equipment	17.4%	NM	90	Wyse Technology	73.3%	90.1%	12
LTX	28.3%	22.8%	52	Measurex	16.7%	50.5%	94	QMS	66.5%	NM	15
Applied Materials	28.0%	67.3%	54	ISC Systems	16.5%	15.6%	96	Intelligent Systems	65.1%	NM	16
Vishay	20.9%	28.5%	71	Evans & Sutherland	16.4%	-29.5%	97	Seagate Technology	62.9%	43.9%	21
Gerber Scientific	17.7%	45.8%	86	Weighted average	29.7%	41.3%		Archive	51.7%	67.6%	27
Hewlett-Packard	15.9%	13.6%	100					MiniScribe	51.1%	55.8%	26
Weighted average	16.5%	15.3%						Micropolis	46.9%	NM	31
								Quantum	35.2%	NM	41
								Intermec	31.9%	19.4%	45
								Emulex	29.5%	10.3%	48
								Applied Magnetics	23.6%	28.7%	62
								Sheldahl	17.8%	NM	84
								Cipher Data Products	17.7%	11.8%	85
								Priam	17.5%	-30.0%	89
								Weighted average	46.3%	29.5%	

Growth master Conner ramps for doubling of shipments

The mini-drive maker has already broken first-year sales records. Tight ins with vendors may help win more glory

In talking fast growth, it would be remiss not to mention one of the hottest growth companies ever — Conner Peripherals Inc.

Riding the coattails of its largest customer, Compaq Computer Corp., the San Jose-based rigid disk drive maker scored record first-year sales of \$113 million, breaking Compaq's own 1983 record of \$111 million — at the time considered to be the fastest first-year performance in U.S. business history.

The newcomer also enjoyed Compaq's early endorsement in the form of a \$12 million equity investment. And Conner's growing customer list reads like a *Who's Who* in laptop computing, including Toshiba America Inc., Zenith Data Systems Corp. and Grid Systems Corp.

(Conner Peripherals, just 3 years old, is excluded from the ELECTRONIC BUSINESS fast-growth survey because the listing qualifies companies according to a five-year compounded annual growth rate.)

Specializing in making and selling 3.5-inch drives for OEMs, Conner finished 1988 with brisk sales of \$257 million, a whopping 127% increase from 1987. Net profits jumped too, to \$20 million, up 74%. In its second year of business, the company went public. But such growth is even more incredible considering that Conner began 1988 with a 25% downturn in first-quarter sales, resulting in about 100 layoffs. It was, at best, a turbulent year for the entire disk drive industry.

However, such hard times, say industry watchers, awakened the industry to increased customer demand for 3.5-inch drives and generally forced the industry to pick up its pace — something the flamboyant, 45-year-old Finis Conner, founder, chairman and CEO of Conner Peripherals, welcomes. "I like the market extremely fast," he says. "While my competitor is trying to figure where to go next, I'm running away from him." Conner

boasts development cycles that are shorter than ever: some six months from concept to full production.

Conner, a 17-year industry veteran and cofounder of drive titan Seagate Technology, saw the market coming: his 1986 business plan proposed first-year sales of \$110 million, \$3 million under actual sales. Quality was a given throughout, despite the demands of fast growth: "In this business, you do not have the luxury of introducing a product and then hoping over time to improve it," says Conner. But managing the firm's climb, he admits, was no easy task.

Conner met part of the growth challenge by parceling out plenty of component and subassembly work. Steering around capital and labor-intensive manufacturing, the company has built strong long-term relationships with customers and suppliers, key to the Conner strategy. Instead of building its own, Conner buys fully assembled and tested com-

ponents such as recording-head stacks. "Our vendors get a higher value-added than they do with other people," says Conner. "We believe the cost is less than doing it ourselves."

Closer with customers

Strategy No. 2 is working closely enough with customers, designing drives early on in the system's design cycle, to gain advantage by gauging the ups and downs of product demand. This gives a good idea of production needs up to a year in advance, taking much of the risk out of over- or under-producing.

A third strategy has been to gear the whole organization for growth, which calls for breaking out new product responsibilities. Former president William Schroeder was recently appointed vice chairman and president of a new products group — this as part of a formal restructuring that took place early this year. The new company president and COO is William J. Almon, an IBM alumnus.

Conner faced plenty of early challenges: being inundated with orders, making a last minute design change and then discovering a key supplier to be unable to ramp-up its production to fill those orders to the new specifications.

Conner's solution was to hire additional staff who could make the components work in the current design. Although not a cost-efficient solution, says Conner, the company managed to keep up with the demand.

Another problem encountered in the fast lane to success was having inadequate staffing to screen incoming vendor products for quality. During 1988, the company hired more than 1,300 employees, sometimes hiring as many as 100 a week. And even though Conner Peripherals now prides itself on having tight working relationships with selected vendors, there was a time when "we had to work with more vendors than we wanted to," says Conner.

And Conner is nowhere near slowing down. Analysts predict the company will double the units it shipped last year to 2 million in 1989. Also, as part of the company's restructuring plan, high-volume manufacturing has been moved from San Jose to a new Singapore plant, which will have a capacity of nearly 3 million units by June.

JOHN MCCREADIE



Fast moves from Finis: Tight deals with vendors, buyers helped give CEO Finis Conner \$113 million in first-year sales

Cindy Charles

TeleVideo: A lesson in how *not* to grow fast

Revenue from the maker of PCs and terminals is nothing like the old days of '83. Here's how growth went negative

Although summer is just around the corner, business is not exactly blooming for TeleVideo Systems Inc. The former high-flying maker of small computers and terminals is now taking a bath in red ink — a sorry situation for a company that once was acclaimed as a classic “rags to riches” immigrant story.

The Sunnyvale, California-based TeleVideo was started in 1975 by Philip Hwang, who just 11 years earlier had arrived from Korea with \$50 in his pocket.

Hwang's display terminals business went well in the wake of the mini-computer revolution; in fact, TeleVideo was heralded as one of the fastest growing companies of the early 1980s. The company also began moving into the small computer systems market, and the talk was of challenging Apple Computer Inc. By 1982, sales had neared \$100 million, and for fiscal 1983, ended Oct. 31, revenue hit \$168 million with net income of \$22.4 million.

It's all been downhill since.

In fiscal 1988, TeleVideo showed losses of over \$39 million on sales of just \$95 million. That represented a steady revenue slide that averaged a negative 10% annual growth.

What went wrong? What's the lesson in all of this for today's fast-growing electronics companies? There's a clear answer from Dallas Talley, TeleVideo's president and COO since last November: “There was not enough focus,” he admits.

Lack of focus

TeleVideo was seduced by the prospect of making bundles in the PC business and lost its lead in the still-vital terminals sector to the more aggressive, more focused rival Wyse Technology. And the firm's lack of focus stemmed partly from what Talley concedes was an attitude of overconfidence. “When you're winning, you have this feeling that you're in-

vincible,” he explains.

Observers cite plenty of other strategic and tactical errors, including a poorly timed move to manufacturing in South Korea. “Maybe it should have been done in 1982 instead of the following year,” laments Talley. The Korean factory has fielded other management distractions: last fall it was hit by a 1-month strike that cut sharply into product availability.

Delivery problems

There have been other difficulties. TeleVideo clearly dropped the ball on delivery, particularly with new models, such as its TelOAS microcomputers and the model 965 multifunction terminal. Greg Blatnik, an analyst with San Jose-based market research firm Dataquest Inc., notes that the company's chief problems stem from late shipping combined with products that are not up to the current level of buyer interest. Getting the product out on time “is always a problem when you're trying to stay on the leading edge,” says Talley. A program is now under way to help ease deliveries back on schedule.

That's no way to grow

TeleVideo's financial results for fiscal years ending Oct. 31 (\$ millions)



The company's most recent financial data cite component shortages (particularly DRAMs) that hurt fiscal 1988's first three quarters, helping scale gross margins back from 1987's average of 26.6% to 9.4% in 1988.

Product demand remains lackluster, as one sales representative of a New England office of major national distributor Arrow Electronics Inc. attests: “There's not too much of a demand from buyers for any of their [TeleVideo's] line. As long as I've been working here, since 1986, I haven't seen one sales rep from TeleVideo walk through our doors.”

Additionally, Philip Hwang is “not the easiest person to deal with,” according to Eileen O'Brien, a researcher with market research firm International Data Corp. of Framingham, Mass. Such difficulties are given as a likely reason for the high executive turnover of recent years. Hwang, as chairman and founder, still owns over 50% of the company. TeleVideo is well aware of the turnover issue and hopes that Talley's recent appointment as president will be the solution, observers say. “By bringing in new blood, TeleVideo feels it will bring a new perspective, a new thrust to its problems,” says O'Brien.

Lack of focus, poor timing, late shipments and inadequate leadership all add up to a former market leader that has been completely eclipsed in seven years. For now, TeleVideo is in the business of regrouping under Talley, with the goal of getting back to the black by the end of October.

The company is trying. In February, it relocated all the firm's U.S. operations, except for its regional sales offices, back to one building in San Jose. The move allows TeleVideo, which has 641 employees worldwide, down from approximately 1,100 in 1983, to consolidate and centralize operations. Among them are manufacturing, sales and marketing, engineering, finance and administrative functions for all local sites as well as for subsidiaries Advanced Transducer Devices and Silicon Logic Inc.

“Moving all of our employees and operations into one facility will be more efficient, and represents another step in the plan to meet our goal of profitability by the end of the fiscal year,” Hwang has said. The next step may have to be even bigger than that.

CARRIE MALONE

Thinking points for managers of high-growth companies

A shrinking "knowledge to implementation" gap means managers must know what to do, and then move fast

It took Apple just seven years; Sun, six years; and Compaq, five years to reach \$1 billion in revenue. Technology-based companies founded before the 1980s took decades to reach that level of revenue. This time compression creates a "knowledge to implementation" gap. Managers not only have to know what to do, they have to do it quickly. Not only are the businesses young, the industries are young as well. There isn't a lot of seasoned expertise in these new industries, and management practices from one industry don't translate easily into another.

Managing growth cannot be done in the abstract. It has to be done with one foot in the market and one foot in the technology. That way, decisions can be made knowledgeably, gauging the opportunities of the market while assessing the capabilities and resources of the company.

Outlined below are five "thinking points" derived from my observations during 25 years of working with many high-tech, high-growth companies.

Think credibility

Credibility doesn't come from words, it comes from meeting or exceeding the expectations of the market. As sincere as you may want to be, your credibility is derived from the people who constitute the infrastructure of your marketplace. Technology businesses and product success or failure are largely based on word of mouth. Technology business is based on a reference system. It cannot be "promoted" into existence. IBM spent an estimated \$100 million advertising the PCjr. It failed anyway. Credibility is built upon the references of your customers, your channels and your third-party support, as well as industry analysts and watchers.

High-growth companies always have difficulty keeping reality and perception in balance. If you're suc-



BY REGIS MCKENNA

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cessful, the marketplace seems to set expectations for you. It acts as a temptress, drawing you into doing and saying things you feel are required of you. Add to that the uncertainty that prevails over rapid success and equally rapid failure in the high-tech business, and you quickly understand the obsession of most management with creating and holding market positions. There seems to be an incessant push to proselytize the world. Instead of concentrating on building a credible position, management often spends its time striving to meet the demands of perception.

Think capital

From the minute you begin thinking about starting a business, and

throughout the life of that business, management is engaged in the process of raising and managing capital. And raising capital requires credibility. In a high-growth business, marketing the company to current and new investors and sources of capital is essential to meeting the expanding demands of adding space, equipment and people. The old maxim "You should raise money when you don't need it" applies particularly to high-growth businesses. The uncertainty of the financial markets, the technology itself, and the ever-changing posture of technology-competitive markets mean that management must keep its fingers on the pulse of the financial markets, seeking opportunities at all times.

High-growth companies are financed, in order of priority, by profits, equity and debt. Profits are crucial to building credibility. Tevye, the lead character in *Fiddler on the Roof*, sings, "If I were a rich man." The lyrics go something like this:

"If I were a rich man, I would sit in the temple and lecture to the wise men all day long. And it wouldn't matter if I were right or wrong. When you're rich, they think you really know."

Profits bring you credibility, not only in the eyes of the financial markets, but in the eyes of your current and potential customers as well. Apple Computer Inc., Digital Equipment Corp., Intel Corp. and Sun Microsystems Inc. are all examples of companies whose financial strength has given them a credible platform for building alliances, raising capital and launching new products.

Think and invest ahead of the problem

When fast-growing businesses have to play catch-up, they begin eating into their credibility. As a result, demand and customers quickly outpace the support systems. The first sign is the telephone system. Customers get frustrated trying to reach people (who are always in meetings) and the phrase "they screwed up" begins circulating throughout their marketplace. However, there is an abundance of things that have to be put into place in anticipation of growth: larger facilities, automated manufacturing, computerization, rapidly upgraded inventory and distribution systems, geographic distribution, organizational development, train-

Caroline Arano

STRATEGIES

FASTEST GROWING COMPANIES

ing, service and many more.

There is no time to learn on the job. You have to act rather than plan. Competition moves quickly to follow up on the next generation of products, creating a sense of urgency. Few companies have experienced the high growth of Adobe Systems Inc., Apple, Ashton-Tate, Convex Computer Corp., Microsoft Corp. or Sun. Early in its history, Apple invested in computerized inventory and distribution systems. The Macintosh factory is well known for its automated systems. Furthermore, the investment took a big gulp, but it paid off as the

Managing growth has to be done with one foot in the market and one foot in the technology

demand for the Mac took off.

Convex invested in an international sales, marketing and services organization long before its competition. Having the support systems in place not only leads to almost half of its sales coming from international business, it also became a barrier to competition.

Tandem Computers Inc. invested in company-wide computer and television networks because CEO Jimmy Treybig believes that the most essential part of managing growth is good employee communication.

Think about your presence in the expanding organization

In high-growth companies there is a tendency for the vision to get lost in the deluge of new people and organizational changes. Decisions must be made quickly. In the high-growth days at National Semiconductor Corp., I remember that all the decision managers were within shouting distance of one another. Meetings could be called quickly. Someone was on a plane within hours to see a customer, to get to a distributor or to visit a plant. These tasks were approached with true team spirit.

As Intel Corp. boomed throughout the late 1970s and early 1980s, members of the executive staff were dispersed to take up their offices in key areas of the company. Senior man-

agement presence provides a sense of direction throughout the organization. It enhances communications and training through close personal contact. At Intel, a senior executive attended every strategy meeting. With Andy Grove, Bill Davidow, Jack Carsten or even Bob Noyce in these meetings, employees learned how Intel made decisions faster than they could in any "training session."

New people come from diverse backgrounds and different company cultures. If the new culture (where we are headed and the way we do things to get there) is not quickly adopted, the organization slows down to solve its internal battles. To overcome this barrier, senior people must have the drive, the will and the presence to make things happen. Senior people have to be of one mind and heart, and they must make their presence felt throughout the organization.

The founders of most high-growth, high-tech companies are loved, feared, admired, respected and sometimes despised. Steve Jobs fits all these categories. But he drove his vision and high-quality standards into everyone around him. He was relentless. That's what it takes.

Think market infrastructure

Every industry has an infrastructure or an array of formal and informal alliances that make that particular industry tick. In the personal computer industry, the infrastructure consists of customers; the third-party software and hardware vendors; the distributors, dealers, value-added resellers; the industry analysts; the financial community; and the press. Ten percent of the infrastructure influences the other 90%. It's important for management to know who's in that influential 10% and to keep in constant touch with them.

This isn't a promotional game. It is within this infrastructure that industry standards are set and accepted, where new products are recognized and either accepted or rejected, where new ideas emerge, where new niches are formed and where the new competition first appears. By keeping in touch with your industry infrastructure, you keep your finger on the pulse of the market. That close contact enables you to make the rapid changes and adjustments so crucial to the health of your business. □

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U.S. firms in Japan finally cash in on the weak dollar

Revenue jumped 32% for big U.S. electronics makers in '88 — better than their Japanese rivals. Pressure to buy American has helped

The 20 largest U.S.-owned electronics companies in Japan, finally benefiting from the weak dollar, are growing faster and getting higher returns than most of their local Japanese rivals. Those top companies sold \$17.3 billion worth of products to the Japanese market in 1988, and produced an additional roughly \$2 billion worth of products there for export back to the United States and to other countries.

That \$17 billion is still not a very big chunk of the roughly \$90 billion Japanese electronics market, but at least it looks a lot better than the U.S.

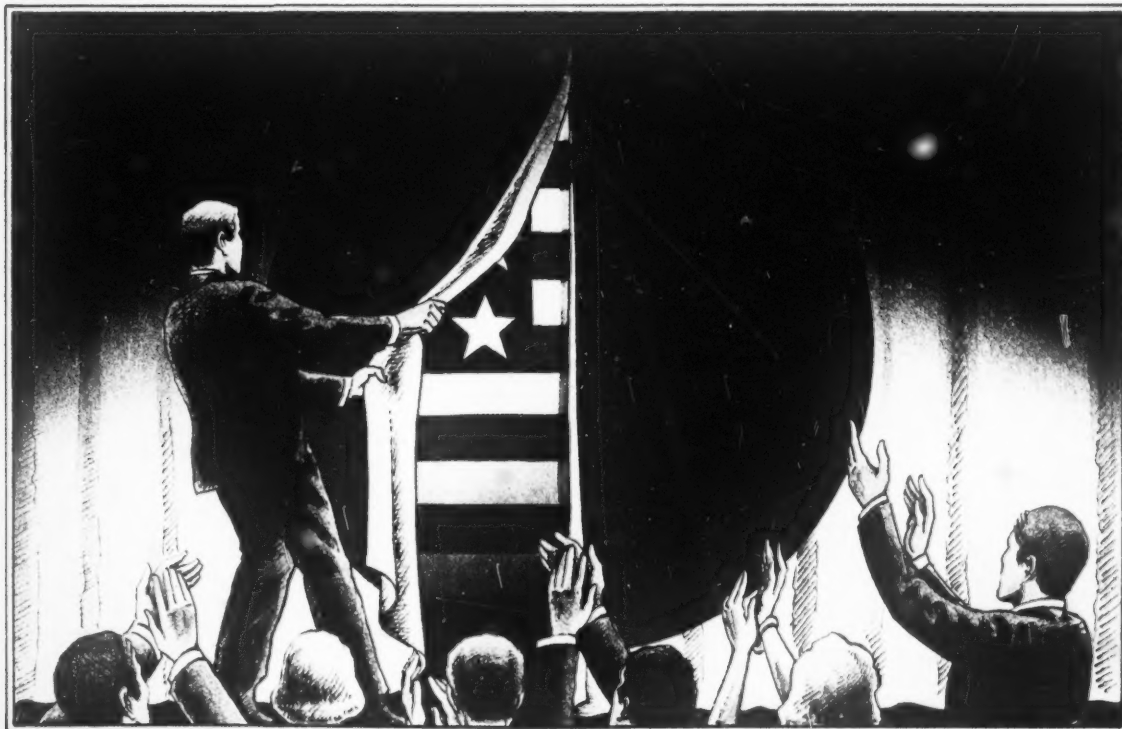
BY PAULA DOE

export numbers. Although total U.S. electronics exports to Japan jumped 43% in 1988, they still came to only \$6.3 billion, according to the American Electronics Association. Straight subtraction of that export figure from the total sales of U.S.-owned companies in Japan suggests the major U.S. electronics companies are producing somewhere around \$13 billion worth of electronics in Japan.

Thanks to the strong Japanese domestic market, favorable exchange rates, and pressure to buy American, the big U.S. companies in Japan saw

average revenue growth of 32% in yen in 1988, or, perhaps more meaningfully, median growth of 18%. Improved exchange rates boosted everyone's dollar-denominated results by another 10% or so.

Fastest growth came at Applied Materials Japan, whose revenue in Japan tripled, reaching \$135 million, as Japanese semiconductor makers went back to buying of advanced production equipment with a vengeance. As a result, semiconductor makers Intel Corp. and Motorola Inc. saw their Japan sales jump 65% and 54%, respectively, thanks to hot microprocessors and pressure on the



Jean Francois Alaux

Japanese to buy American.

The U.S. computer makers mainly matched or surpassed growth rates of the Japanese market and of their local rivals. Total Japanese output of computers and industrial electronics equipment increased 14% to 15% in 1988, according to the Electronics Industry Association of Japan.

The 20 largest Japanese electronics makers averaged 10% growth for the year ended March 1988, paced by 14% growth at Fujitsu Ltd. and 11% at NEC Corp. DEC Japan and Yokogawa Hewlett-Packard had 25% and 27% growth, respectively, while IBM Japan, Fuji Xerox, and Nippon Unisys matched the Japanese market with 13% to 16% growth.

Other companies that didn't quite reach this year's \$130 million cutoff point to make our top 20 ranking also realized impressive growth. Sun Microsystems Inc. says its sales in Japan jumped 115% to some \$116 million. Tandem Computers Inc. saw sales increase 68%, to about \$67 million.

Slowest growth — a mere 3% to 7% — among the big companies came at those highly dependent on Japanese defense spending, such as Nippon Avionics and Mitsubishi Precision, where the U.S. partner holds a minority share.

Many of the big U.S. companies are also squeezing U.S.-style margins out of the Japanese market, although, naturally, subsidiaries without the full burden of corporate costs such as R&D, or even in some cases manufacturing, should have higher returns. But while net income at the 20 largest Japanese electronics companies averaged 2% to 3% of revenue in the most recent fiscal year, earnings averaged 7% at the large U.S.-owned companies in Japan for which results are available. Applied Materials earned 26% on its Japan sales; Molex Japan, 14%; and YHP and DEC, 9%.

Fuji Xerox made the sharpest improvement in earnings, upping its net income 175%, to 4% of revenue. Yamatake Honeywell saw 106% improvement, also to 4% of revenue.

Despite the good year for the big U.S. companies in Japan, the AEA estimates the U.S. deficit in electronics trade with Japan increased by 2% — from \$20.1 billion in 1987 to \$20.5 billion last year — as Japanese electronics exports to the U.S. increased 9.4% to \$26.8 billion. By comparison, the U.S. reduced its to-

Top U.S. companies in Japan

1988 rank	Company	Sales in Japan (\$ millions)	Total sales of Japanese unit (\$ millions)	Sales growth (in yen)	Net income/sales	Earnings growth (in yen)	Fiscal year ended
1	IBM Japan	\$6,500	\$9,200	13%	15% ¹	20% ¹	12/88
2	Fuji Xerox (50% owned by Rank Xerox)	2,800	3,519	16%	4%	175%	10/88
3	Nippon Unisys (39% owned by Unisys)	2,000 ²	1,485 ³	14% ³	2% ³	20% ³	3/88
4	Yokogawa HP (75% owned by Hewlett-Packard)	835	899	27%	9%	70%	10/88
5	NCR Japan	710	842	7%	7%	-7%	11/88
6	Yamatake Honeywell (50% owned by Honeywell)	607	735	18%	4%	106%	9/88
7	Texas Instruments	591	—	32%	—	—	12/88
8	DEC Japan	562	562	25%	9%	-2%	6/88
9	AMP Japan	410	420	—	—	—	12/88
10	Nihon Business Computer (35% owned by IBM Japan)	315	315	18%	-2%	—	3/88
11	Motorola	290	—	54%	—	—	12/88
12	Intel	285	—	65%	—	—	12/88
13	Yokogawa Medical Systems (75% owned by General Electric)	250	350	—	—	—	11/88
14	Nippon Avionics (25% owned by Hughes)	232	237	3%	2%	38%	3/88
15	Molex Japan	164	188	13%	14%	13%	6/88
16	Sony Tektronix (50% owned by Tektronix)	163	175	—	—	—	5/88
17	Mitsubishi Precision (40% owned by Singer)	151	151	7%	1%	31%	3/88
18	National Semiconductor	135	—	11%	—	—	12/88
19	Applied Materials Japan	135	135	188%	26%	—	10/88
20	Advanced Micro Devices	134	—	39%	—	—	12/88

All yen figures are converted at the 1988 average rate of ¥130 = \$1. Because their years ended at different times, some companies used slightly different exchange rates in their own reporting.

¹ Pretax figures

² Estimated Unisys revenue in Japan includes that of the units formerly known as Nippon Univac, Oki Univac and Burroughs Japan, now merged into Nippon Unisys

³ Nippon Unisys results reported for the year ending March 1988 still include only the old Nippon Univac

Sources: ELECTRONIC BUSINESS, Dataquest Inc.

tal worldwide electronics trade deficit by 25%, to \$9.6 billion. In terms of Japanese sales to the United States, the 18 largest Japanese companies tracked by ELECTRONIC BUSINESS had estimated sales of about \$27 billion in the U.S. in 1987, the latest year for which figures are available. Total electronics exports from Japan came to \$25 billion that year.

ELECTRONIC BUSINESS estimates major U.S. electronics companies' sales in Japan from company reports and discussions with company officials. For those companies that do not release their Japan results, we

rely on Japanese sources, such as news releases published in the Japanese press and compendiums of corporate financials such as Tokyo Keizai's quarterly *Kaisha Shikiho*. Fairly detailed financial information is published in Japan for almost all corporate entities, thanks in part to Japanese government regulations. We don't try to track those companies that sell through agents in Japan and have no separate corporate entities. The market research firm Dataquest Inc. of San Jose supplies its estimates of U.S. semiconductor makers' sales in Japan. □

Savvy Brits snap up small U.S. distributors

The British are coming! U.K. distributors such as Electron House are building New World empires by buying regionals

Too late, the British are here. A weak dollar and a buoyant British economy have meant easy pickings for British investors in the United States. Historically, they have outspent all others, including the Japanese and the Germans, in direct U.S. investments. So it should come as no surprise that America's electronics distribution is acquiring a British accent, too.

In March, \$160 million Britain-based Electron House Plc paid \$11.15 million for Philadelphia-based Almo Electronics Inc., making it the second British company to enter the U.S. electronics distribution industry this decade. The other was the 1981 purchase by Lex Service Plc of Schweber Electronics, and the subsequent acquisition of four other distributors. Lex is the third largest U.S. distributor today with component sales of around \$542 million.

Says Almo's president Anthony Cucchi: "The reason for doing this is so Electron House can grow rather dramatically and can take advantage of the trend toward consolidation in the electronics distribution industry." Any new additions could be either folded into Almo or kept separate depending on what is acquired, he says.

U.S. opportunities

In an industry where long-term profitability is anything but a sure thing, what prompts a foreigner to invest? Quite simply, opportunity. "We believe U.S. distributors are badly run," says Tim Redburn, Electron House's finance director. In general, there is not enough attention to detail, overhead is too high and operating expenses are generally out of hand, he says.

In the British electronics distribution business, operating expenses as a percentage of sales hover around 15% while in the United States, they are around 18%, says Redburn. Similarly, British net profit is usually be-

tween 5% and 7%, while in the United States it is closer to 2%. With a leaner organization, there is every reason to expect a U.S. distributor to perform as well as a British one, he adds.

With an eye on the bottom line, Electron House intends on building a \$250 million distribution empire in the United States. It will do so by buying up more midsized distributors, putting it in contention for a

top 10 position in the industry.

Besides \$45 million Almo, Electron House also owns Pacesetter Electronics Inc., a \$10 million West Coast semiconductor distributor that was bought in 1986. It is looking for acquisitions in the \$30 million to \$70 million range in California, Texas, Florida and the Midwest, says Redburn.

Cultural problems

While Electron House is optimistic about fitting into America, there is always the possibility of cultural problems. Of the three board members of Electron House Inc. — the U.S. subsidiary of the British parent set up to oversee American operations — only Cucchi has any U.S. electronics distribution experience. But he holds a minority share of 10% in Electron House Inc. while Electron House Plc. has 44% and the British venture backers retain 46%.

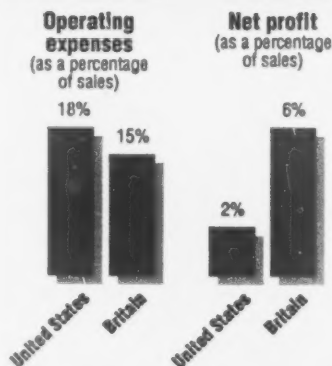
Problems might develop if Cucchi is vetoed on major strategic decisions. Looking back on the early days of Lex, it had its share of headaches learning the ropes too. Trying to understand Schweber and the way the market worked meant making some mistakes. Schweber was profitable after Lex acquired it and is said to be only modestly profitable now, sources say. There are even rumors that Lex is looking to divest itself of its U.S. electronics distribution operations — rumors the company refutes.

Electron House claims to be up on Lex in two respects: First, Cucchi is a recognized valuable asset. Besides being Almo's president, he is also the president of the National Electronic Distributors Association (NEDA), the industry's trade organization, so he provides much-needed insight, as Redburn says. Second is the fact that Almo is profitable. Even though it could be doing "a couple of points better," says Redburn, there is a base to build on.

Does Electron House's move herald a full-fledged British invasion? Probably not in the near-term. Other leading British players do not appear to be poised to expand into the U.S. market just now. However, informed sources say they should not be dismissed. Companies to watch include Diploma Plc, Farnell Electronics Plc and STC.

BRUCE RAYNER

The British want to show U.S. companies how distribution's done...



Source: Electron House Plc

...and are making the buys to prove it

Purchaser	Purchased (Date)
Lex Service	Schweber Electronics (1981)
Electron House	Pacesetter Electronics (1986)
Electron House	Almo Electronics (1989)
Electron House	? (1990)

Source: ELECTRONIC BUSINESS

BUSINESS BAROMETER

FORECASTS FOR ELECTRONICS, COMPUTERS AND SYSTEMS

Leadtimes in detail

Weeks, monthly averages	1988	FORECAST		
		1st qtr. 1988	1st qtr. 1989	1st qtr. 1990
Discrete semiconductors	7.1	7.3	7.1	6.8
Integrated circuits	6.9	7.0	6.5	6.4
Memory circuits	13.0	11.0	12.4	8.8
Microprocessors	8.9	8.4	9.1	7.5
Displays	8.2	8.4	9.0	6.6
Capacitors	6.5	5.8	6.4	5.4
Connectors	6.5	6.6	6.4	7.0
Printed circuit boards	5.6	5.6	6.0	5.3
Relays	7.5	6.8	9.8	9.1
Resistors	4.9	4.7	4.5	4.2
Switches	6.2	5.8	6.2	6.3
Wire and cable	3.9	4.0	4.1	4.2

Historical data: Electronics Purchasing; Forecast: Cahners Economics

Leadtimes falling in early 1989

After a summer of tight supplies for such critical components as memory devices and microprocessors, buyers found deliveries speeding up in early 1989. Still, delivery times for some parts, due to the run-up in leadtimes last summer, continued to remain a bit higher than the previous winter, so buying challenges are not over yet.

Delivery times for memories, after jumping over 15 weeks last summer, had fallen three weeks by the first quarter of 1989. That's good news for buyers, obviously. But the leadtime data indicates something else again for sellers in the component marketplace.

Demand down, supplies up

Slowing delivery times now indicate two phenomena. First, demand for components is slowing. Growth in computer and office equipment shipments may be slacking off a bit in 1989. Other major end users of components may also be slowing.

Second, supplies of some key components are now more accessible as new capacity has come on stream. The 1-megabit DRAM device, which was in short supply last year, will be easier to find in 1989 as yields at fabrication plants improve and new fab sites begin operation. As yields improve, prices of this device are expected to drift downward this year.

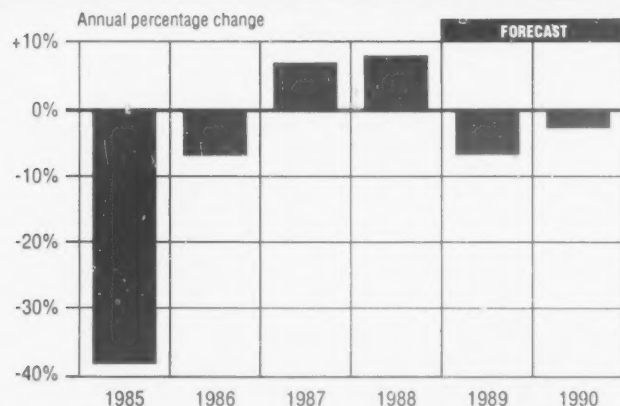
The combination of slowing end-market demand and growing supplies is causing delivery times for components to decline. The result: Component shipments will be growing slower in 1989, and may even decline a bit.

Look at the two charts adjacent to this column. The growth path for component leadtimes mirrors the growth path for component production. When leadtimes begin to head down for more than one quarter, chances are production of components will follow some downward trajectory too. Clearly, leadtime growth has passed its peak set last summer. Now, in early 1989, production has also begun to show a downward trend in growth.

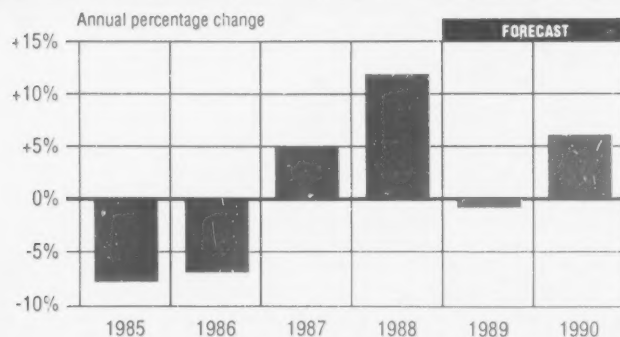
So, while leadtimes mean one thing to the buyer of components, market watchers who need to plan their company's forecast — whether it be computers, communication equipment, consumer electronics or test equipment — may well want to take a second look at the component leadtimes' numbers. In fact, the leadtime statistic is one critical element in the ELECTRONIC BUSINESS leading indicator.

ELIZABETH B. BAATZ

Electronic component leadtimes



Electronic component production

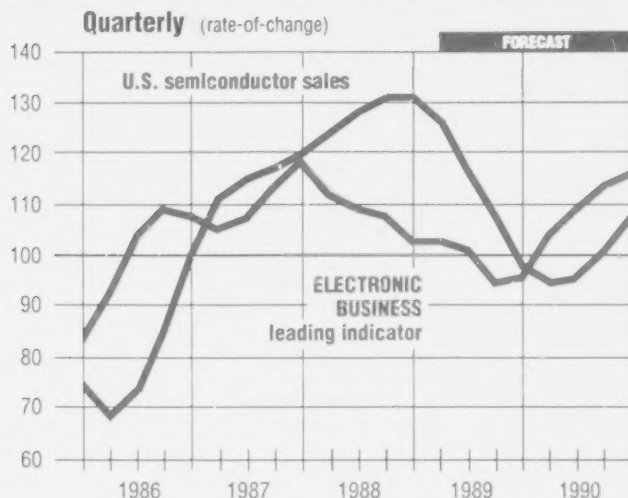


Historical data: Electronics Purchasing; Forecast: Cahners Economics

BUSINESS BAROMETER

FORECASTS FOR ELECTRONICS, COMPUTERS AND SYSTEMS

ELECTRONIC BUSINESS leading indicator



The ELECTRONIC BUSINESS leading indicator predicts turning points in U.S. semiconductor sales with about a three- to nine-month leadtime. For more information please contact Elizabeth Baatz, senior economist, Cahners Publishing Co., 275 Washington St., Newton, Mass., 02158, or call (617) 558-4368



The ELECTRONIC BUSINESS leading indicator inched up to 102.8 in January, the first significant monthly increase since 1987. This slight upward action doesn't confirm a business cycle point yet, it's just a minor resting period. The indicator is still expected to turn upward this September.

Source: Cahners Economics

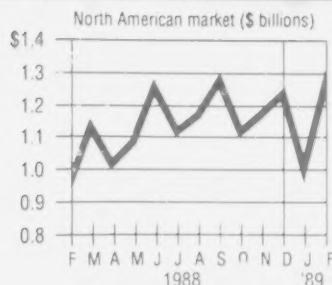
Electronics industry indicators this month

	Latest month	Previous month	Year ago	1988 average
ELECTRONIC BUSINESS leading indicator (rate-of-change, Jan.)	102.8	101.0	112.8	107.6
U.S. semiconductor bookings (\$ millions, 3-month average, Feb.)	\$1,243	\$1,124	\$1,116	\$1,178
Weekly hours of semiconductor production workers (monthly average, Jan.)	39.5	40.9	40.5	40.2
Electronic components leadtime index (1977 = 100, March)	117.7	104.0	107.8	108.9
S&P's semiconductor stock price index (1970 = 10, monthly average, Feb.)	51.0	49.0	52.9	54.4
Change in electronic components inventories (\$ millions, SA, Jan.)	+\$52	-\$135	+\$110	+\$80
Contract and orders for plant and equipment (\$ billions, SA, Jan.)	\$44.6	\$43.6	\$37.7	\$39.4

SA = seasonally adjusted, all other data is not seasonally adjusted

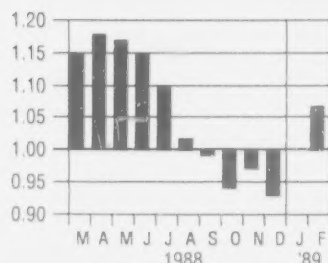
Sources: Semiconductor Industry Association, U.S. Bureau of Labor Statistics, Electronics Purchasing magazine, Standard & Poor's, U.S. Commerce Department, U.S. Bureau of Economic Analysis

Semiconductor sales



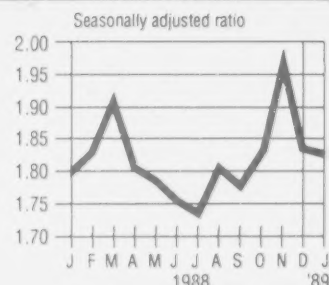
Source: Semiconductor Industry Association

Semiconductor book-to-bill ratio



Source: Semiconductor Industry Association

Component inventory-to-shipsments



Source: U.S. Commerce Department